5.9 HYDROLOGY AND WATER QUALITY

This section provides an evaluation of the proposed project's impacts to hydrology and water quality within the project site and vicinity. Information contained in this section is summarized from the following documents:

- *Preliminary Drainage Report Quarry Creek*, Project Design Consultants, October 2012 (Appendix M-1);
- *Hydromodification Screening for Quarry Creek*, Chang Consultants, October 2012 (Appendix M-2);
- *Hydraulic and Scour Analyses for the Quarry Creek Bridge*, Chang Consultants, October 3, 2012 (Appendix M-3);
- *Preliminary Storm Water Management Plan for Quarry Creek*, Rick Engineering Company, October 5, 2012 (Appendix M-4);
- *Water System Analysis for Quarry Creek*, Dexter Wilson Engineering, Inc., March 23, 2012 (Appendix M-5);
- *EIR-Level Soil and Geologic Reconnaissance: Quarry Creek II*. GEOCON Incorporated, October 20, 2011 (Appendix J-1).
- *Former South Quarry Amended Reclamation Plan Draft and Final EIR* (referred to herein as Reclamation Plan Environmental Impact Report [EIR]), Helix Environmental Planning Inc, September 2008 and February 2010, respectively.

The technical appendices are included on the attached CD found on the back cover of this EIR. Additional background information on land uses was gathered from the City of Carlsbad General Plan and Zoning Ordinances.

5.9.1 Existing Conditions

Regional Hydrology

According to the San Diego Hydrologic Basin Planning Area Map, Region 9 of the Regional Quality Control Board (RWQCB), the project site is within the Carlsbad Hydrologic Unit (HU), 1 of 11 such drainage areas designated in the 1994 San Diego Regional RWQCB Basin Plan, as amended. The Carlsbad HU is a roughly triangular shaped area of approximately 210 square miles, and extends from east of Lake Wohlford to Solana Beach-Carlsbad along the coast. The Carlsbad HU is divided into a number of hydrologic areas and subareas based on local drainage characteristics with the project site and vicinity located with the El Salto Hydrologic Subarea (HSA) of the Buena Vista Creek Hydrologic Area (HA). Drainage within the Carlsbad HU is provided by a number of small to moderate size streams, including Buena Vista, Agua Hedionda, San Marcos, and Escondido creeks. Surface drainage in the El Salto HSA occurs primarily through Buena Vista Creek, which includes a watershed area of approximately 14,500 acres (22.7 square miles). Buena Vista Creek extends generally east-west through the project site, and continues west before ultimately entering Buena Vista Lagoon in the City of Carlsbad approximately two miles downstream of the western site boundary. Annual precipitation in the Carlsbad HU ranges from approximately 11 inches along the coast to over 25 inches in the Laguna Mountains (Helix 2008).

The project site is part of a larger watershed area that incorporates off-site (upstream) properties including the adjacent Quarry Creek Plaza shopping center. The storm drain outfall from the Quarry Creek shopping center discharges into the eastern portion of the project site; with the associated flows entering Buena Vista Creek. Surface flows leaving the project site continue generally to the west in Buena Vista Creek and ultimately enter Buena Vista Lagoon (Helix 2008). Figure 5.9-1 illustrates the existing project site drainage basins and hydrologic soils groups.

The majority of the Reclamation parcel of the project site has been previously disturbed and the natural topography altered in association with quarrying operations. Existing on-site land uses include asphalt recycling facility, previously reclaimed (filled) portions of the quarrying operation, stockpiled aggregate and bioremediation materials, disturbed and undisturbed portions of Buena Vista Creek, native habitat areas, and a number of unpaved roads and trails.

Site topography is characterized by an overall grade to the west, with generally level to moderately sloping terrain along Buena Vista Creek and steeper slopes in the northern and southern portions of the project site. Much of the original topographic profile on the Reclamation parcel has been altered through previous mining activities, subsequent reclamation (fill) efforts and disposal of waste materials.

Existing On-site Drainage

Existing on-site drainage areas include areas that are part of the Reclamation parcel and other areas farther to the west on the Panhandle parcel that are currently undeveloped. For the areas that are not a part of the Reclamation parcel, existing drainage patterns are dictated by steep slopes and heavily vegetated natural channels and natural drainage conveyances.

Grading associated with the Reclamation activities have largely been completed on the Reclamation parcel. Runoff from the on-site reclaimed area generally sheet flows towards the Buena Vista Creek. Swales and ditches collect the runoff and direct the overland flow into various temporary desilting basins. There are two basins on the north side of Buena Vista Creek and one basin on the south side of the Buena Vista Creek. The runoff collected in each basin is collected in a large-diameter culvert that outlets into Buena Vista Creek within the riprap drop structures.

Existing Off-site Drainage

The existing off-site drainage patterns include a significant amount of off-site run-on from areas both to the north and to the south of the project site. The off-site drainage area to the north includes an area within the City of Oceanside. This drainage area collects in a storm drain system that drains underneath State Route 78 (SR-78) and connects into an on-site storm drain pipe that runs north to south through the site but does not commingle with on-site runoff. The pipe discharges to Buena Vista Creek via an outfall separate from the other on-site storm drain systems.

The southerly off-site run-on drainage areas include runoff from the steep hillsides to the south and the southeast of the proposed building pads. The hillside runoff is collected in a vast system of brow ditches with multiple outlet points. Portions of the residential development located to the south of the project contribute run-on onto the project site.

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Existing Drainage Basins and Hydrologic Soils Groups

FIGURE 5.9-1

There are two main tributary channels within the project site that are located to the west of the portion of the site disturbed by mining and reclamation grading. The drainage channel immediately to the west of the Reclamation parcel runs south to north and confluences with the Buena Vista Creek channel within the project site limits. The other drainage channel conveys a significant amount of off-site drainage in a northwesterly direction through the project site, and eventually confluences with Buena Vista Creek approximately 1,300 feet beyond the project site boundary.

The runoff from the adjacent Quarry Creek Plaza shopping center, immediately to the east of the project site, discharges into an on-site storm drain pipe that runs in a northwesterly direction through the project site but does not commingle with on-site water.

Stormwater runoff from the project site discharges into a tributary of Buena Vista Creek, as well as directly to Buena Vista Creek and flows westerly to Buena Vista Lagoon and ultimately discharges to the Pacific Ocean. The project site will maintain drainage patterns similar to the pre-project condition hydrologic characteristics; therefore, stormwater runoff from the proposed site will discharge to Buena Vista Creek and flow westerly to Buena Vista Lagoon and ultimately discharge to the Pacific Ocean.

Storm Drains

The project site is located within Zone 25 of the City's Local Facilities Management Plan (LFMP). Few urban drainage facilities presently exist within Zone 25. This is due to the fact that the zone is presently undeveloped and drainage facilities will be constructed as development progresses. The storm water within the Buena Vista Lagoon watershed flows through natural drainage courses into Buena Vista Creek into the lagoon.

Flooding

The project site and vicinity have been mapped for flood hazards by the Federal Emergency Management Agency (FEMA) (1997). This mapping identifies a 100-year floodplain on-site associated with Buena Vista Creek, with related base flood elevations ranging from approximately 73 feet above mean sea level (AMSL) along the western project site boundary to 150 feet AMSL in the northern corner of the project site. The limits of the existing 100-year floodplain mapped by FEMA within the project site extend between approximately 50 to 700 feet laterally from Buena Vista Creek. However, the applicant will be required to submit a Conditional Letter of Map Revision (CLOMR) to FEMA and obtain approval, which would modify the 100-year floodplain within the project area. Additionally, the applicant will be required to submit a Letter of Map Revision (LOMR) through FEMA for approval. Upon approval, the proposed development pads of the Master Plan will not be within any floodplain or flood hazard zones.

Groundwater

According to GEOCON, groundwater was encountered in the major lower drainage areas of Buena Vista Creek and its tributaries at elevations between 70 and 80 feet mean sea level (MSL). Depth of groundwater is subject to fluctuations from natural season variations.

Surface Water Quality

Surface water within the project site consists predominantly of flows from storm events and irrigation runoff from upstream development. No known surface water quality data are available for the project site or immediate vicinity, with storm flows and irrigation runoff subject to variations in water quality due to

local conditions such as flow volumes and land use (Helix 2008). Based on the disturbed condition of much of the Reclamation parcel and adjacent disturbed and/or developed areas to the north, east, and west, surface water quality within the project site is expected to be generally poor.

The principal surface waters located within and/or downstream of the project site include Buena Vista Creek and Buena Vista Lagoon. Existing water quality data for these areas include quantitative monitoring/testing and/or biological assessment (bioassessment) studies for Buena Vista Creek and Buena Vista Lagoon, as well as bi-annual qualitative evaluations conducted by the State Water Resources Control Board (SWRCB). These sources include both historical and current efforts, as summarized below.

In association with local and regional water agency programs and requirements under the National Pollutant Discharge Elimination System (NPDES) and related Municipal Storm Water Permit requirements, surface water quality monitoring has been and is being conducted within the Buena Vista Creek watershed. These efforts include bioassessment studies and ambient lagoon/bay monitoring conducted pursuant to the NPDES Municipal Permit beginning with the 2001/2002 storm season, as well as bioassessment studies conducted by the RWQCB between 1998 and 2002 (Helix 2008). Additionally, quantitative sampling was conducted along Buena Vista Creek in 2002 under the State Surface Water Ambient Monitoring Program (SWAMP).

Bioassessment Monitoring

As stated previously, bioassessment studies were conducted as part of both NPDES Municipal Storm Water Permit requirements and a separate program implemented by the RWQCB between 1998 and 2002. These efforts involved monitoring at five sites located along Buena Vista Creek, including the following locations and sampling dates (Helix 2008):

- Two sites located just west of Santa Fe Avenue, approximately 3.5 miles upstream of the project site. The first of these sites was sampled under the RQWCB program in May, September and November of 1998, and May and November of 1999; while the second site was sampled as part of the NPDES monitoring efforts in June and October of 2001 and May of 2002.
- One site located just west of College Boulevard, approximately 0.25 mile upstream of the project site. This site was sampled as part of the NPDES monitoring efforts in October 2001, May and October of 2002, and October of 2003.
- Two sites located just east and west of South Vista Way, approximately 1.5 miles downstream of the project site. The first of these sites was sampled under the RQWCB program in May, September, and November of 1998; May, September and November of 1999; and May and November of 2000; while the second site was sampled as part of the NPDES monitoring efforts in June of 2001.

The bioassessment testing involved evaluation of (among other criteria) the taxonomic richness (i.e., number of taxonomic groups) and diversity (i.e., species diversity within taxonomic groups) of benthic macroinvertebrate (BMI) communities. All tested sites were assessed for the condition of BMI communities, which reflect, at least in part, associated water quality conditions.

Test results for all of the noted locations and dates include predominantly low scores for the noted criteria, indicating a high probability of poor overall water quality conditions (Weston Solutions, Inc. [Weston] 2007; MEC Analytical, Inc. [MEC] 2005 and 2004; RWQCB 2002, 2001 and 1999, as cited by Helix 2008).

Ambient Bay and Lagoon Monitoring

Ambient bay and lagoon monitoring was initiated in the 2002/2003 storm season for a number of coastal waters, including Buena Vista Lagoon. The intent of this monitoring program is to document conditions including sediment chemistry, toxicity and ecological community structure, as well as to provide indications of the overall status of marine life and determine priorities for additional investigations and remedial actions. Preliminary (Phase I) efforts consisted of conducting literature reviews, and implementing sediment sampling efforts to assess grain size distributions and correlations with total organic carbons (TOC) content. Specifically, these analyses are based on the premise that fine-grained sediments tend to have relatively large surface areas that are susceptible to adsorption by contaminants including metals and pesticides (Helix 2008). Initial results for Buena Vista Lagoon identified three (out of nine) samples with TOC/grain size relationships that were identified for additional (Phase II) analysis beginning in the 2003/2004 storm season (MEC 2004, as cited by Helix 2008). The Phase II program involved testing of samples from the three noted sites for sediment chemistry, toxicity and benthic community structure. Samples obtained from Buena Vista Lagoon between 2003 and 2005 exhibited generally low individual and overall (i.e., relative to other sampled embayments) quality rankings for sediment chemistry and benthic community structure, and low to moderate rankings for toxicity. These rankings indicate generally poor water quality conditions, although they were qualified somewhat by the fact that Buena Vista Lagoon is closed to the ocean, receives no tidal exchange, has no salt water influence, and functions more as a freshwater lake or wetland than a coastal estuary (Weston 2007, MEC 2005, as cited by Helix 2008).

Surface Water Ambient Monitoring Program (SWAMP)

The SWAMP is a statewide effort to integrate existing water quality monitoring activities of the SWRCB and RWQCB, as well as to coordinate these efforts with other monitoring programs. A single station located approximately 1.5 miles downstream of the project site was sampled for water chemistry and toxicity under this program in March, April, June, and September of 2002 (Helix 2008). The results of these efforts identified the following conclusions: (1) applicable physical/chemical water quality objectives (e.g., the RWQCB Basin Plan, refer to the discussion of Regulatory Framework below) were exceeded for total sulfate during two of four sampling events; and for pH, nitrate/nitrite, lead, and diazinon during one of four sampling events; and (2) toxicity to five individual test organisms exceeded applicable thresholds in nine of 20 total test events (Weston 2007, as cited by Helix 2008)).

Bi-annual Clean Water Act Assessments

The SWRCB produces bi-annual qualitative assessments of statewide and regional water quality conditions. Since 1998, these assessments have focused on federal Clean Water Act (CWA) Section 303(d) impaired water listings and priority status for assignment of total maximum daily load (TMDL) requirements. The Section 303(d) and TMDL assessments involve prioritizing waters on the basis of water quality (i.e., impaired) status and the necessity for assigning quantitative contaminant load restrictions (i.e., TMDL), with these data submitted to the U.S. Environmental Protection Agency (U.S. EPA) for review and approval. The 2006 assessment identified the following impaired waters in areas up- and downstream of the project site: (1) 11 miles of Buena Vista Creek listed for sediment toxicity; (2) 202 acres in Buena Vista Lagoon listed for bacterial indicators, nutrients and sedimentation/siltation; and (3) 1.2 miles of the Pacific Ocean shoreline in the Buena Vista Creek HA listed for bacterial indicators (SWRCB 2012).The most current (2008) assessment was approved by the SWRCB on April 19, 2010, and approved by the U.S. EPA on October 11, 2011. No new data were

assessed for 2008; therefore, the impaired waters mentioned are still identified as being impaired (SWRCB 2012).

Groundwater

Groundwater quality monitoring has occurred in areas within and adjacent to the project site between 2001 and 2006 in association with hazardous materials remediation efforts related to the previous occurrence of underground storage tanks (USTs) for petroleum fuels (Helix 2008). Associated sampling and testing efforts have identified the presence of hydrocarbon related contaminants such as benzene and methyl-tert-butyl-ether (MTBE) at high concentrations, confirming that contaminates from one or more USTs have entered local groundwater aquifers. Based on these observations and the surface water quality conditions described above, groundwater quality in the project site vicinity is characterized as poor.

Water Quality Summary

Based on the above discussions, existing surface and groundwater quality within the project site and vicinity is assumed to be generally poor. This conclusion is based on the noted surface water monitoring data from up- and downstream waters, the largely urban nature of the associated watershed, and the presence of groundwater contaminates related to previous USTs within the site.

5.9.2 Regulatory Setting

Federal

Clean Water Act

The U.S. EPA is the lead federal agency responsible for managing water quality. The CWA of 1972 is the primary federal law that governs and authorizes the U.S. EPA and the states to implement activities to control water quality. The various elements of the CWA that address water quality and are applicable to the projects are discussed below. Wetland protection elements administered by the U.S. Army Corps of Engineers (USACE) under Section 404 of the CWA, including permits for the discharge of dredged and/or fill material into waters of the United States, are discussed in Chapter 5.4, Biological Resources.

Under federal law, the U.S. EPA has published water quality regulations under Volume 40 of the Code of Federal Regulations. Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the U.S. As defined by the CWA, water quality standards consist of two elements: (1) designated beneficial uses of the water body in question; and (2) criteria that protect the designated uses. Section 304(a) requires the U.S. EPA to publish advisory water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use. The U.S. EPA is the federal agency with primary authority for implementing regulations adopted under the CWA. The U.S. EPA has delegated the State of California the authority to implement and oversee most of the programs authorized or adopted for CWA compliance through the Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act), which states that the SWRCB has the ultimate authority over State water rights and water quality policy.

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the U.S. must obtain a water quality certification from the

SWRCB in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate.

CWA Section 402 establishes the NPDES permit program to control point source discharges from industrial, municipal, and other facilities if their discharges are directly to surface waters. The 1987 amendments to the CWA created a new section of the CWA devoted to regulating storm water or nonpoint source discharges (Section 402[p]). In California, the EPA has delegated the SWRCB responsibility for issuing both general and individual permits for discharges from certain activities with the authority generally administered by the RWQCB.

CWA Section 303(d) Impaired Waters List

CWA Section 303(d) requires states to develop lists of water bodies that will not attain water quality standards after implementation of minimum required levels of treatment by point-source dischargers. Section 303(d) requires states to develop a TMDL for each of the listed pollutants and water bodies. A TMDL is the amount of loading that the water body can receive and still be in compliance with applicable water quality objectives and applied beneficial uses. TMDLs can also act as a planning framework for reducing loadings of a specific pollutant from various sources to achieve compliance with water quality objectives. TMDLs prepared by the state must include an allocation of allowable loadings to point and nonpoint sources, with consideration of background loadings and a margin of safety. The TMDL must also include an analysis that shows links between loading reductions and the attainment of water quality objectives.

The impaired water bodies listed on the 303(d) list for the San Diego Hydrologic Area include the Buena Vista Creek, which runs through the study area, and the Buena Vista Lagoon. There are no other waterways traversing the study area that are included on the 303(d) list. The impairments listed for the Buena Vista Creek are selenium and sediment toxicity. The impairments listed for Buena Vista Lagoon are indicator bacteria, nutrients, and sedimentation/siltation (SWRCB 2012).

Antidegradation Policy

The federal Antidegradation Policy, established in 1968, is designed to protect existing uses, water quality, and national water resources. The federal policy directs states to adopt a statewide policy that includes the following primary provisions:

- Existing in-stream uses and the water quality necessary to protect those uses shall be maintained and protected.
- Where existing water quality is better than necessary to support fishing and swimming conditions, that quality shall be maintained and protected unless the state finds that allowing lower water quality is necessary for important local economic or social development.
- Where high-quality waters constitute an outstanding national resource, such as waters of national and state parks, wildlife refuges, and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

The federal Antidegradation Policy would be applicable to the study area, which would include an on-site stormwater collection system that would be subject to the review and approval of the San Diego RWQCB.

Federal Emergency Management Agency

The Federal Emergency Management Agency administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations that limit development in floodplains. The Federal Emergency Management Agency also issues Flood Insurance Rate Maps (FIRMs) that identify which land areas are subject to flooding. These maps provide flood information and identify flood hazard zones in the community. The design standard for flood protection covered by the FIRMs is established by FEMA, with the minimum level of flood protection for new development determined to be the 1-in-100 (0.01) annual exceedance probability [AEP]) (i.e., the 100-year flood event).

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act, also known as the California Water Code, is California's statutory authority for the protection of water quality. Under this act, the state must adopt water quality policies, plans, and objectives that protect the state's waters. The act sets forth the obligations of the SWRCB and San Diego RWQCB pertaining to the adoption of Water Quality Control Plans and establishment of water quality objectives. Unlike the federal CWA, which regulates only surface water, the Porter-Cologne Act relates surface water, groundwater, and discharges to land.

San Diego Regional Water Quality Control Board Basin Plan

The San Diego RWQCB Basin Plan is designed to preserve and enhance water quality and protect the beneficial uses of all region waters. Each of the nine regional boards in California is required to adopt a Basin Plan, which recognizes and reflects regional differences in existing water quality, the beneficial uses of the region's ground and surface waters, and local water quality conditions and problems. Specifically, the Basin Plan:

- Designates beneficial uses for surface and ground waters;
- Sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state's anti-degradation policy;
- Describes implementation programs to protect the beneficial uses of all waters in the region;
- Describes surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan.

Beneficial uses of surface water and groundwater have been established for each water body within the San Diego Basin. According to the RWQCB Basin Plan:

- Beneficial uses are defined as the uses of water necessary for the survival or well being of man, plants, and wildlife. The uses of water serve to promote the tangible and intangible economic, social, and environmental goals of mankind.
- Examples include the drinking, swimming, industrial, and agricultural water supply, and the support of fresh and saline aquatic habitats. According to the Basin Plan, beneficial uses have been designated for specific coastal water bodies, inland surface waters, and groundwater.

In 1972, the State Water Resources Control Board (SWRCB) adopted a uniform list and description of beneficial uses to be applied throughout all hydrological basins of the State. Water bodies that have beneficial uses that may be affected by construction activity and post-construction activity include Buena Vista Creek (El Salto Hydrologic Subarea) and Buena Vista Lagoon. Table 5.9-1 identifies the designated beneficial sues for Buena Vista Creek and Lagoon.

In terms of groundwater, the majority of the of the El Salto Hydrologic Subarea groundwater area is located just south of the project site. Table 5.9-1 identifies the beneficial uses associated with the El Salto Hydrologic Subarea groundwater area. The beneficial uses are applicable to the portion of the El Salto Hydrologic Subarea groundwater area tributary to Buena Vista Creek.

Table 5.9-1. Beneficial Uses of Project Affected Surface Water and Groundwater

Beneficial Uses	Buena Vista Creek	El Salto Hydrologic Subarea (Groundwater)
MUN	+	•
AGR	•	•
IND	•	o
REC-1	•	--
REC-2	•	--
WARM	•	--
WILD	•	--
RARE	•	--

Legend:
- • Existing Beneficial Use
- o Potential Beneficial Use
- \+ Exempted by the Regional Board from the municipal used designation

The following are definitions of the applicable beneficial uses.

- **Municipal and Domestic Supply (MUN)** – Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- **Agricultural Supply (AGR)** – Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
- **Industrial Service Supply (IND)** – Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
- **Contact Water Recreation (REC-1)** – Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural springs.
- **Non-Contact Water Recreation (REC-2)** – Includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

- **Warm Freshwater Habitat (WARM)** – Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
- **Wildlife Habitat (WILD)** – Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
- **Rare, Threatened, or Endangered Species (RARE)** – Includes uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

California Toxics Rule

Under the California Toxics Rule (CTR), the EPA has proposed water quality criteria for priority toxic pollutants for inland surface waters, enclosed bays, and estuaries. These federally promulgated criteria create water quality standards for California waters. The CTR satisfies CWA requirements and protects public health and the environment. The EPA and the SWRCB have the authority to enforce these standards, which are incorporated into the NPDES permits that regulate the point discharges in the Study Area.

NPDES Construction Permits

Construction activities are regulated under the NPDES General Permit for Discharges of Storm Water Runoff Associated with Construction Activity (General Construction Permit, NPDES Order No. 2009-009-DWQ) which covers stormwater runoff requirements for projects where the total amount of ground disturbance during construction exceeds one acre. Coverage under a General Construction Permit requires the preparation of a Storm Water Pollution Prevention Plan (SWPPP) and submittal of a Notice of Intent (NOI) to the RWQCB to comply with the General Construction Permit. The SWPPP is required to include a description of Best Management Practices (BMPs) to minimize the discharge of pollutants from the sites during construction. Typical BMPs include temporary soil stabilization measures (e.g. mulching and seeding), storage of materials and equipment to ensure that spills or leaks cannot enter the storm drain system or stormwater, and using filtering mechanisms at drop inlets to prevent contaminants from entering storm drains. Typical post-construction management practices include street sweeping and cleaning stormwater drain inlet structures. The NOI includes site-specific information and the certification of compliance with the terms of the General Construction Permit. The Project would exceed the one acre threshold and, therefore, would be subject to the requirements of the General Construction Permit.

Regional General Municipal Stormwater Permit

The RWQCB has adopted an area-wide Municipal Stormwater Permit, Order No. R9-2007-0001, NPDES No. CAS0108758, "Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Stormwater Sewer Systems (MS4s) Draining the Watersheds of the County of San Diego, the incorporated Cities of San Diego County and the San Diego Unified Port District." Under this area-wide Municipal Stormwater Permit, municipalities are ultimately held responsible for everything in their stormwater conveyance systems, including industrial and construction stormwater runoff. Order No. R9-2007-0001 presents guideline requirements for the control of pollutants resulting from stormwater and urban runoff from all areas named in NPDES Permit No. CAS0108758. The RWQCB specifically

requires co-permittees to inventory existing stormwater pollution control programs, illicit discharge detection programs, monitor programs and data, stormwater conveyance system maps, land use maps, and existing laws, ordinances, and codes. The co-permittee (discharger) has the authority to implement and enforce stormwater management programs in their areas of jurisdiction and where necessary, and to promulgate the authority to carry out all functions of the stormwater management programs.

The municipal stormwater permit requires co-permittees to utilize planning procedures including a master plan to develop, implement, and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. This new permit addresses controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed. With respect to land use planning for new development and redevelopment, at a minimum, each co-permittee shall assess its general plan, modify development project approval processes, revise environmental review processes, and conduct education efforts focused on new development and redevelopment to minimize the short and long-term impacts on receiving water quality.

Local

San Diego County

The County of San Diego's March 2011, *Final Hydromodification Management Plan*, and January 8, 2011, *Standard Urban Stormwater Mitigation Plan* (SUSMP) outline low flow thresholds for hydromodification analyses. A hydromodification analysis includes continuous simulation hydrologic models to compare the pre-project and mitigated post-project runoff peaks and durations (with hydromodification flow controls) until flow control standards are met.

Integrated Management Practices and extended detention facilities are required to meet peak flow and duration controls as follows:

1. For flow rates ranging from 10 percent, 30 percent or 50 percent of the pre- project 2- year runoff event ($0.1Q_2$, $0.3Q_2$, or $0.5Q_2$) to the pre-project 10-year runoff event (Q10), the post-project discharge rates and durations shall not deviate above the pre-project rates and durations by more than 10 percent over and more than 10 percent of the length of the flow duration curve. The specific lower flow threshold will depend on results from the SCC\X1RP channel screening study and the critical flow calculator.
2. For flow rates ranging from the lower flow threshold to Q5, the post-project peak flows shall not exceed pre-project peak flows. For flow rates from Q5 to Q10, post-project peak flows may exceed pre-project flows by up to 10 percent for a one-year frequency interval. For example, post-project flows could exceed pre-project flows by up to 10 percent for the interval from Q9 to Q10 or from Q5.5 to Q6.5, but not from Q8 to Q10.

The thresholds are based on a percentage of the pre-project two-year flow (Q_2), i.e., $0.1Q_2$ (low), $0.3Q_2$ (medium), or $0.5Q_2$ (high). A threshold of $0.1Q_2$ represents a downstream receiving conveyance system with a high susceptibility to erosion. This is the default value used for hydromodification analyses and will result in the most conservative (greatest) on-site facility sizing. A threshold of $0.3Q_2$ or $0.5\ Q_2$ represents downstream receiving conveyance systems with a medium or low susceptibility to erosion, respectively. In order to qualify for a medium or low susceptibility rating, a project must perform a channel screening analysis based on a "hydromodification screening tool" procedure developed by the Southern California Coastal Water Research Project (SCCWRP). The SCCWRP results are compared

with the critical shear stress calculator results from the County of San Diego's BMP Sizing Calculator to establish the appropriate susceptibility threshold of low, medium, or high.

5.9.3 Project Impacts

5.9.3.1 Thresholds of Significance

As defined in Appendix G of the *California Environmental Quality Act (CEQA) Guidelines*, project impacts with regards to hydrology and water quality would be considered significant if the project was determined to:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage system or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- Expose people or structures to a significant risk or loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- Inundation by seiche, tsunami, or mudflow.

5.9.3.2 Environmental Impacts

Water Quality

Construction Impacts

Potential water quality impacts are associated predominantly with short-term construction activities including grading, excavation, and construction of drainage facilities. Specifically, these potential impacts include erosion/sedimentation, discharge of construction-related hazardous materials (e.g., fuels, etc.), and erosion/sedimentation and/or contaminant discharge from the disposal of extracted groundwater (if required). However, with implementation of construction BMPs (as outlined in the SWPPP) during construction, potential impacts to water quality will be reduced to a level less than significant. In addition, all runoff conveyed in the proposed storm drain systems will be treated in compliance with RWQCB

regulations and NPDES General Permit No. CAS000002, "General Permit for Stormwater Discharges Associated with Construction Activity." The Regional General Construction Stormwater Permit must include:

- NOI;
- SWPPP; and
- Monitoring Program and Reporting Requirements.

In addition, RWQCB Order No. R9-2007-0001 (NPDES Permit No. CAS0108758) sets waste discharge requirements for discharges of urban runoff from municipal storm separate drainage systems draining the watersheds of San Diego County. Post-Construction BMPs shall include source-control, site design, and treatment control BMPs.

Operational Impacts

Once constructed, the project site will likely generate certain pollutants commonly found in similar developments that could affect water quality downstream from the project site. Pollutants are generated from residential developments, streets, and parking lots. Specifically, the proposed project has the potential to result in long-term impacts on water quality due to the addition of pollutants typical of urban runoff, including:

- Motor oil and fluids that leak from cars onto streets;
- Oil, paint, or household cleaners dumped in gutters;
- Soap and dirt from car washing;
- Dirt and lawn clippings;
- Litter and grime that collects on parking lots and sidewalks;
- Bare soil that erodes and flows into the street;
- Weed killers, fertilizers, and pesticides; and
- Animal wastes.

In order to mitigate any potential water quality impacts as a result of runoff, all runoff from developed planning areas will be treated prior to draining downstream into the Buena Vista Creek. As described below, the project will incorporate source control BMPs, site design BMPs, treatment control BMPs, and hydromodification basins in appropriate locations which will protect downstream properties in compliance with the City of Carlsbad SUSMP program, the City's Municipal Permit and the State's General Construction Permit. The following summarizes these water quality control features:

- *Source Control BMPs* – Including resident educational programs, maintenance practices, pest control management, etc.
- *Treatment Control BMPs* – Treatment control BMPs are numerically sized facilities such as bioretention or extended detention basins. A large amount of storm water on-site will be directed to landscape areas to dissipate and filter pollutants through the use of select planting material in water quality facilities before the drainage reaches Buena Vista Creek. Such facilities collect and slowly convey runoff flow to downstream locations, thereby providing treatment of runoff before it moves downstream in Buena Vista Creek. .
- *Site Design BMPs* – Water quality facilities (e.g. extended detention basins/hydromodification basin) will treat the water with bio-treatment in accordance with best management practices for storm water in order to treat potential contaminants in storm water run-off reaching natural

drainage courses downstream from the project site. All runoff from developed planning areas will be treated prior to draining downstream into the Buena Vista Creek. Examples of site design BMPs include but are not limited to: minimizing impervious areas, disconnect discharges (discharge runoff to landscaped areas), conserve natural areas, stenciling inlets and signage, landscape design (e.g. drought resistant plants), water efficient irrigation, slope and channel protection, use of trash enclosures to prevent transport of trash.

- *Hydromodification* – In accordance with the Municipal Permit and the County of San Diego Final Hydromodification Management Plan (Final HMP) dated March 2011, the project will employ a hydromodification strategy which will implement measures to meet the following criteria:

    - For flow rates ranging from 10 percent, 30 percent, or 50 percent of the pre-project two-year runoff event to the pre-project 10-year event, the post-project discharge rates and durations may not deviate above the pre-project rates and durations by more than 10 percent over more than 10 percent of the length of the flow duration curve.

Treatment control facilities are intended to provide locations for water quality treatment elements to treat the water with biological or other filters in accordance with best management practices for storm water in order to minimize potential contaminants in storm water run-off before reaching natural resources downstream from the project site. The proposed project's treatment control BMPs are numerically sized BMPs based on the required sizing criteria provided in the SUSMP. The SWMP report (Rick Engineering, 2012) recommends extended detention basins as Integrated Management Practices (IMPs). The IMPs are facilities that were numerically sized to satisfy both the treatment control BMP (best management practices) and hydromodification (flow-control) BMP requirements.

Figure 5.9-3 illustrates the proposed Storm Water Management Plan for the project. As shown in Figure 5.9-3, the runoff from the site will be collected and treated in extended detention basins as shown on Figure 5.9-3 as EDB 1, EDB 3-2, EDB 3-3, EDB 3-7, EDB 4, EDB 5 and EDB 6.

The potential water quality impact associated with operation of the project is considered a significant impact. Implementation of the water quality features identified in the Storm Water Management Plan would reduce this impact to a level less than significant. Implementation of Mitigation Measure WQ-2 would ensure that improvement plans are reviewed and approved by the City, that demonstrate that pollutants will be controlled through compliance with the City of Carlsbad SUSMP and Stormwater Management Program (SWMP). Approval of such plans shall be subject to a determination by the Carlsbad City Engineer that the proposed project has incorporated the post-development water quality pollution control site design BMPs, source control BMPs, and structural treatment control BMPs.

Groundwater Supply and Recharge

Impervious surfaces would be created with development of the proposed project. Regional absorption and infiltration rates would not be significantly affected, given the limited size of proposed development within the context of the entire hydrologic unit and that approximately 88 acres of the 156-acre site (or 56%) of the project site will remain in open space allowing for groundwater recharge to occur. Runoff would be discharged into the Buena Vista Creek, allowing for percolation in the channel bottom similar to the existing condition. Therefore, a less than significant impact on groundwater recharge is identified.

The proposed project is located within the service area of the Carlsbad Municipal Water District (CMWD) and is eligible for water service (Water Supply Assessment, Appendix Q-1 of this EIR). Future development within the project site would not require the use of groundwater for the water supply (see

Section 5.15 of this EIR for further discussion regarding water supply). The proposed project will connect to the municipal water system within the City. No on-site wells are proposed. Therefore, a less than significant impact on groundwater supplies is identified.

Drainage Alteration Resulting in Substantial Erosion or Siltation

Erosion and Siltation

Implementation of the proposed project includes the use of machinery and materials handling and storage (e.g., asphalt, gravel) during all phases of construction. These activities would require the use of graders and other earthmoving equipment during initial site preparation, which would generate dust and require the use of water trucks to meet fugitive dust requirements (see Section 5.3 of this EIR for air quality impacts mitigation regarding fugitive dust). The use of water trucks increases the potential for silt to exit the project site and enter the surrounding Buena Vista Creek watershed. Therefore, the proposed project has the potential to result in a significant impact related to erosion and siltation during construction activities. Implementation of Mitigation Measure WQ-1 would reduce the potential erosion and siltation impact to a level less than significant.

Drainage Pattern Alteration

For the purposes of hydromodification analysis, the pre-project condition is based on-site topography created from aerial photography dated September 2006 by Project Design Consultants. The Municipal Permit requires projects to manage increases in runoff discharge rates and durations for a range of flows which are likely to cause erosion, sediment pollutant generation, or other impacts to beneficial uses and stream habitat. Historically, the channels to which the project discharges have been responding to the natural watershed characteristics that existed prior to any reclamation activities. The mass graded reclamation condition is a manufactured condition which does not accurately represent the watershed that formed the downstream channels. To comply with the intent of the Municipal Permit, the post-project condition should be compared to the natural watershed characteristics to which the receiving channels have been responding. Therefore, for the proposed project it is appropriate to use the historical topography for the pre-project hydromodification analysis as opposed to the mass graded condition. Three overall discharge areas are evaluated. The first overall discharge area represents the combined northerly discharges to the Buena Vista Creek channel, the second represents the combined southerly discharges to the Buena Vista Creek channel, and the third represents the combined discharges to the westerly finger canyon located to the south of PA R-5. Tables 5.9-2, 5.9-3, and 5.9-4 summarize the hydrology results for each of these three drainage areas and the corresponding project outfalls. Exhibits A-1, A-2, and A-3 depict the existing drainage basins, and Exhibit B depicts the proposed drainage basins, as provided in the *Preliminary Drainage Report Quarry Creek*, Project Design Consultants, October 2012 (Appendix M-1).

As shown in these tables, peak flows will increase at these outfall locations over existing conditions; however, the combined post-project flows are less than those identified in the hydrology analysis associated with the Reclamation Plan. Therefore, the project would not create an impact associated with capacity or velocity dissipation associated with these outlets.

As shown in the table below, the post-project flow is greater than the as-built design flow rate. This is due to an increase in drainage area to the outfall compared with the condition assumed in the previous reclamation plan hydrology study. The *Preliminary Drainage Report Quarry Creek* indicates that pipe conveyance capacity and the energy dissipation outfall will not be exceeded in the post-project condition.

Table 5.9-2. Hydrology Results for Overall Drainage Area #1 (Includes all Northerly Outfalls to Buena Vista Creek)

Outfall Storm Drain Name	Existing Conditions			Proposed Conditions			Previous As-built Design (Ultimate Condition Assumed in Reclamation Report)		
	Name of System	Q_{100} (cfs)	Contrib. Area (acres)	Name of System	Q_{100} (cfs)	Contrib. Area (acres)	Name of System	Q_{100} (cfs)	Contrib. Area (acres)
SD Line 1 per DWG 470-SA	Portion of System 100, 200, 300	209.9	71.4	System 100	210.0	71.4	System 100	216.2	72.4
SD Line 3 per DWG 470-SA	Portion of System 100, 200, 300	36.4	16.5	System 200	42.8	14.3	System 200	82.8	16.2
SD Line 4 per DWG 470-SA	Portion of System 100, 200, 300	17.1	10.7	System 300	58.9	13.1	System 300	32.5	8.2
Confluence (Sum) =		257.5	98.6	Sum =	311.7	98.7	Sum =	331.6	96.7

Table 5.9-3. Hydrology Results for Overall Drainage Area #2 (Includes all Southerly Outfalls to Buena Vista Creek)

Outfall Storm Drain Name	Existing Conditions			Proposed Conditions			Previous As-built Design (Ultimate Condition Assumed in Reclamation Report)		
	Name of System	Q_{100} (cfs)	Contrib. Area (acres)	Name of System	Q_{100} (cfs)	Contrib. Area (acres)	Name of System	Ultimate Q_{100} (cfs)	Contrib. Area (acres)
SD Line 5 per DWG 470-5A	System 400	84.7	55.2	System 400	79.6	39.2	System400	117.4	56.8
New Line A	System 600	199.2	90.9	System 600	207.4	80.8	N/A	N/A	N/A
New Line A	--	--	--	System 700	90.2	26.6	N/A	N/A	N/A
Total	Sum =	283.9	146.1	Sum =	377.2	146.6	Sum =	--	--
Other									
SD Line 2 per DWG 470-5A	N/A	160.0	--	N/A	160.0	--	N/A	160.0	--

Table 5.9-4. Hydrology Results for Overall Drainage Area #3 (Outfall to Westerly Finger Canyon)

Existing Conditions			Proposed Conditions		
Name of System	Q_{100} (cfs)	Contrib. Area (acres)	Name of System	Q_{100} (cfs)	Contrib. Area (acres)
System 500	25.7	13.9	System 500	53.5	13.5

The project's grading plans are designed to mimic the existing drainage patterns and drainage areas that currently drain to the various existing outfalls. Project outfalls will be equipped with energy dissipation structures to offset the concentration of flows in order to minimize erosion. Further, hydromodification management facilities (including bioretention extended detention basins) are proposed within the Master Plan project site in accordance with the Municipal Permit and the Final HMP. Based on the report titled "Hydromodification Screening for Quarry Creek" (Chang Consultants 2012), the project's hydromodification management plan can be designed based on 50 percent of the pre-project two-year runoff event. By implementing hydromodification strategies pursuant to the criteria set forth in the Final HMP, for the flow rate of 50 percent of the pre-project two-year runoff event to the pre-project 10-year event, the post-project discharge rates and durations may not deviate above the pre-project rates and durations by more than 10 percent over more than 10 percent of the length of the flow duration curve, the proposed project will result in a less than significant impact to the downstream channel in the form of erosion or siltation.

Consistent with the requirements of the Reclamation Plan, the Buena Vista Creek has been enlarged to accommodate the 100-year flow, and a series of drop structures have been constructed within the portion of the Creek that traverses the Reclamation parcel. These drop structures were designed and constructed in order to flatten the longitudinal creek slope to minimize and control erosive flow velocities. The Buena Vista Creek channel design includes several environmental considerations. First the channelization includes seven drop structures that are intended to be obscured by the proposed channel habitat. The drop structures are constructed of varying height and placed at irregular intervals along the channel. Second, the channel profile allows portions of the existing channel habitat to be preserved. Third, the channel bottom width was designed greater than that needed for 100-year flood conveyance in order to create more habitats. Fourth, the channel banks include meandering terraces that can be inundated during smaller storm events. The proposed project does not involve any alterations to the portion of Buena Vista Creek that traverses the project site.

Southern California Coastal Water Research Project Analysis

Chang Consultants conducted a SCCWRP screening analysis for the proposed project in October 2012. As proposed, surface runoff from the proposed project and tributary off-site areas will be collected by a series of on-site storm drain systems, which will connect into the backbone drainage infrastructure. Figure 5.9-2 depicts the Master Drainage Plan for the proposed project. Additional detail is provided in the Vesting Tentative Map exhibits provided in Appendix C of this EIR. The storm drain systems will have seven discharge locations. Five of the discharge locations will be directly into the Buena Vista Creek channel recently constructed as part of the Quarry Reclamation Plan. Buena Vista Creek flows in a westerly direction and bisects the easterly portion of the site. The sixth storm drain discharge location will be into an existing minor, natural drainage course approximately mid-way along the southerly development area. This drainage course is referred to as the Middle Tributary and flows a short distance to the north and confluences into Buena Vista Creek. The final discharge location will be into an unnamed natural tributary canyon to Buena Vista Creek. The canyon is located just beyond the westerly edge of the southerly development area and flows in a northwesterly direction into Buena Vista Creek. This tributary is identified as the West Tributary.

The SCCWRP screening tool requires both office and field work to establish the vertical and lateral susceptibility of a downstream receiving channel to erosion. A screening analysis was performed to assess the low flow threshold for each point of compliance.

The project runoff will be collected by Buena Vista Creek, a Middle Tributary to Buena Vista Creek, and a West Tributary to Buena Vista Creek. Each of these watercourses is natural, so has a susceptibility to erosion. The project runoff will discharge into the watercourses at various storm drain outfalls, which are the "points of compliance" (shown on Figures 5.9-1 and 5.9-3) A downstream channel assessment was performed for each point of compliance. The results indicate a low threshold for vertical and lateral susceptibilities for all of the study reaches. This is consistent with the field conditions because the majority of the downstream watercourses are either engineered channels or densely vegetated channels exhibiting limited evidence of erosion.

The Hydromodification Management Plan (HMP) requires that these results be compared with the critical stress calculator results incorporated in the County of San Diego's BMP Sizing Calculator. The BMP Sizing Calculator critical stress results for the reaches immediately below each point of compliance are included in Hydromodification Study in Appendix M-2 of this EIR. The critical stress results returned a low threshold. Therefore, the SCCWRP analyses and critical stress calculator demonstrate that the entire project can be designed assuming a low susceptibility to erosion, (i.e., $0.5Q_2$).

No significant impacts related to drainage alteration would occur based on the following considerations:

- Overall drainage patterns within and from the site would not change;
- Buena Vista Creek would be maintained essentially in its existing location, with no substantial rerouting of flows either within or tributary to the creek;
- All of the proposed drainage facilities would help to return the Buena Vista Creek channel to a more natural condition as described by emulating the historic channel configuration more closely and protecting the on-site channel from flow-related erosion and stream degradation; and
- The existing El Salto Falls structure would not be physically impacted by the proposed modifications, and no significant change in the associated flow volumes or velocities would result.

Otherwise Substantially Degrade Water Quality

The proposed project will not otherwise substantially degrade water quality. Treatment control BMPs and hydromodification management facilities will be installed and maintained to protect water quality per the municipal stormwater permit. Please refer to the preceding analysis regarding water quality.

Flood Hazards

100-Year Flood Plain

According to Reclamation Plan EIR, a 100-year floodplain associated with Buena Vista Creek extends through portions of the project site. Based on the design of the creek channel as outlined in the Amended Reclamation Plan, the noted 100-year floodplain would be contained within the proposed channel in all on-site areas located upstream of the proposed drop structure, with no associated floodway impacts (i.e., increased floodplain elevations) or increased flood hazards to off-site properties (Helix 2008). A supplemental HEC-RAS study was conducted as part of the Amended Reclamation Drainage Report (Chang 2007) to identify the minimum required elevations of the proposed project building pads relative to the 100-year floodplain. Pursuant to this analysis, all proposed pad elevations within the site extend a minimum of one foot above the calculated 100-year floodplain elevations (Chang 2007).

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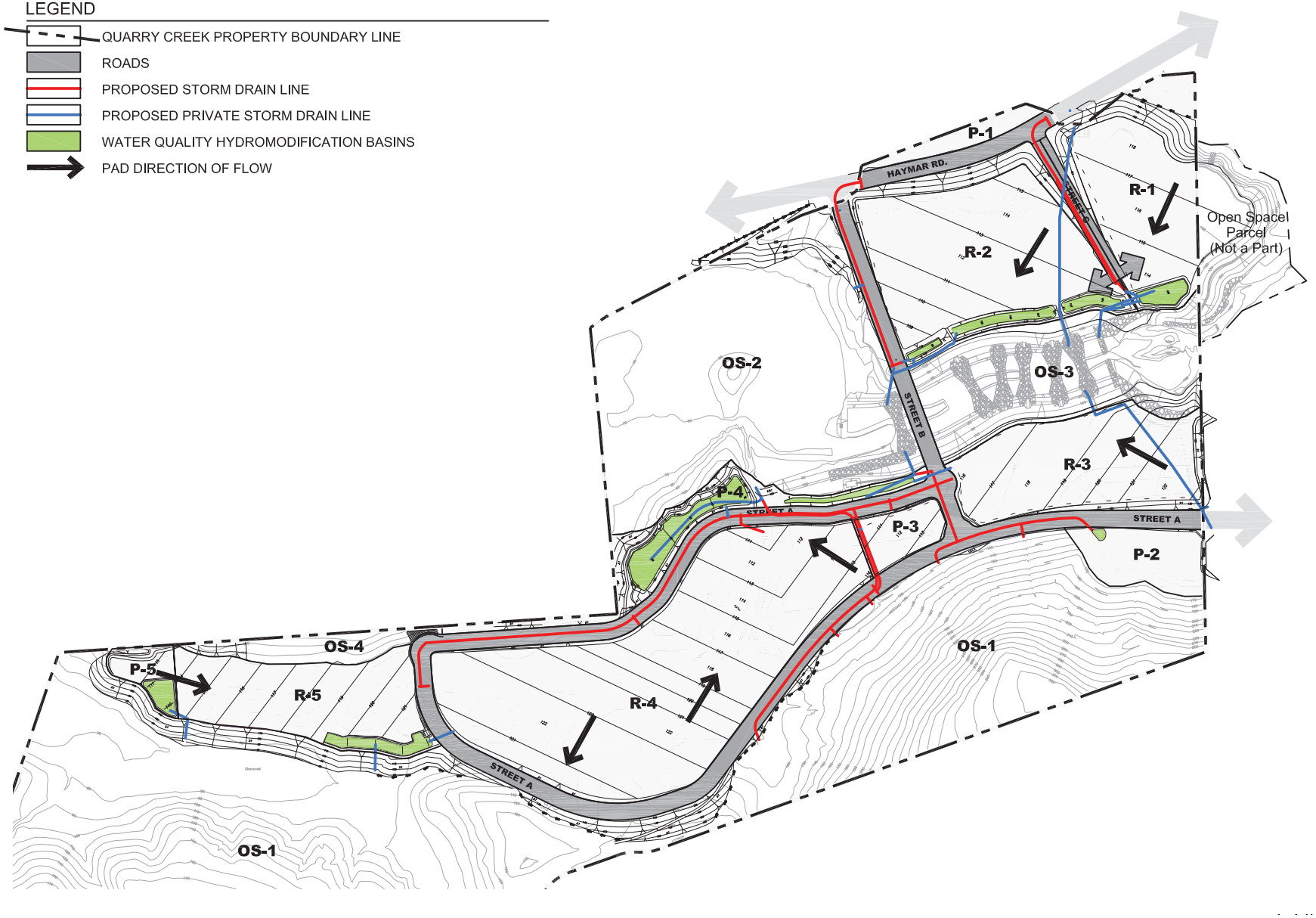

Proposed Master Drainage Plan

FIGURE 5.9-2

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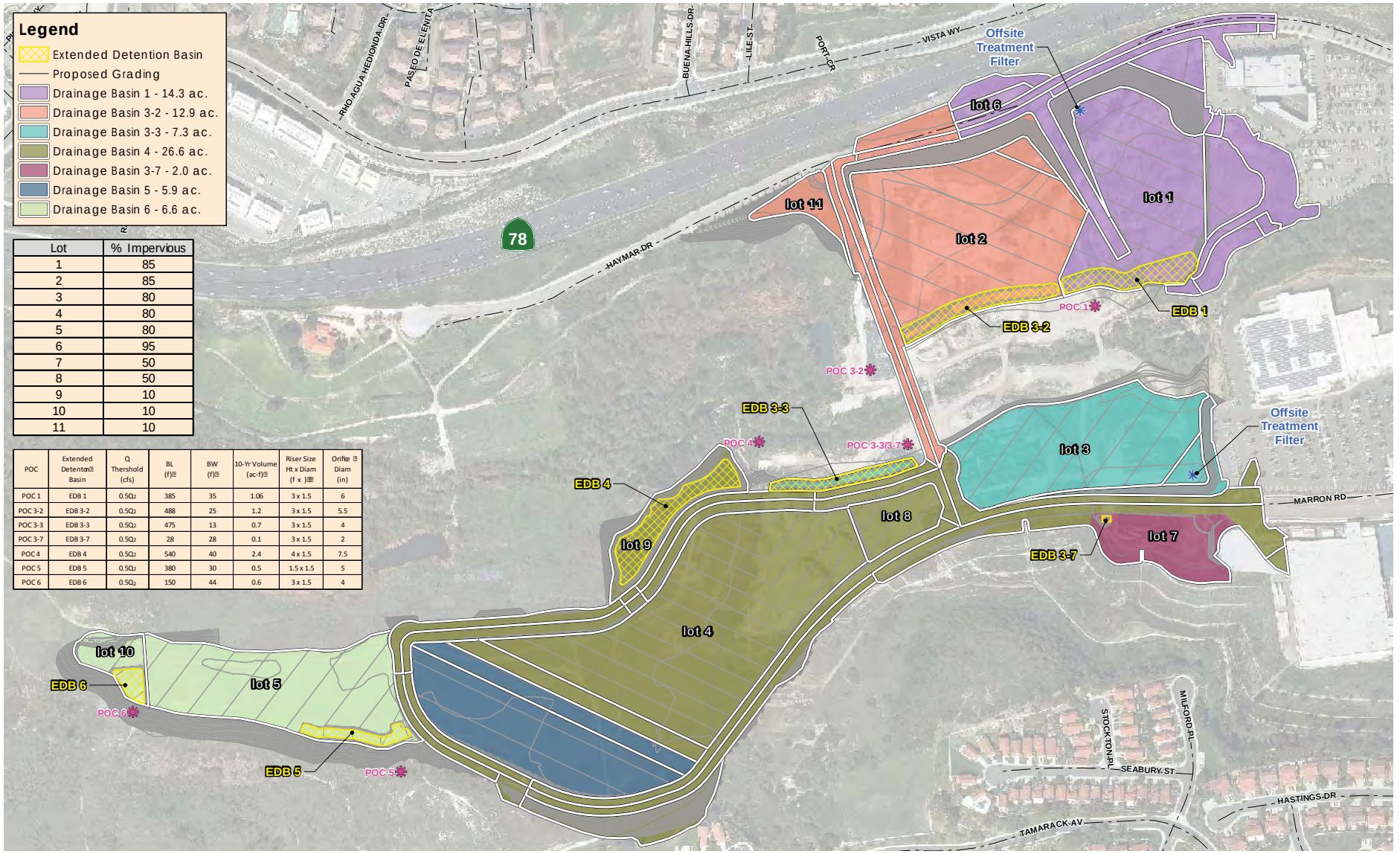

Lot	% Impervious
1	85
2	85
3	80
4	80
5	80
6	95
7	50
8	50
9	10
10	10
11	10

POC	Extended Detention Basin	Q Thershold (cfs)	BL (f)	BW (f)	10-Yr Volume (ac-f)	Riser Size Ht x Diam (f x)	Orifice Diam (in)
POC 1	EDB 1	0.5Q_2	385	35	1.06	3 x 1.5	6
POC 3-2	EDB 3-2	0.5Q_2	488	25	1.2	3 x 1.5	5.5
POC 3-3	EDB 3-3	0.5Q_2	475	13	0.7	3 x 1.5	4
POC 3-7	EDB 3-7	0.5Q_2	28	28	0.1	3 x 1.5	2
POC 4	EDB 4	0.5Q_2	540	40	2.4	4 x 1.5	7.5
POC 5	EDB 5	0.5Q_2	380	30	0.5	1.5 x 1.5	5
POC 6	EDB 6	0.5Q_2	150	44	0.6	3 x 1.5	4

Storm Water Management Plan Exhibit

FIGURE 5.9-3

Based on the described conditions, the proposed project would not result in significant impacts related to floodway effects, off-site flood hazards, or placement of development within a mapped 100-year floodplain. Because the proposed project would entail grading and related activities within the mapped floodplain, however, the final project design would include the results of an approved CLOMR from FEMA. A CLOMR provides FEMA comments on proposed development that would affect the hydrologic or hydraulic characteristics of a flooding source, and therefore result in the modification of the associated regulatory floodway, base flood elevations, or special flood hazard area designations. The CLOMR for reclamation grading has been withdrawn. An updated CLOMR will be processed as part of the conditions of approval for the proposed project. Upon approval, a LOMR will be processed. Once FEMA approves the LOMR, the project developable pads will no longer be located within mapped floodplain hazard areas.

Grading under the Reclamation Plan for the former South Coast Quarry has resulted in channelization of Buena Vista Creek within the Reclamation parcel of the project site. The channelization created a vegetated trapezoidal channel with a 150-foot bottom width, 2.5 to 1 side slopes, a terrace along each channel bank, and seven riprap drop structures. Three existing bridge crossings have been removed as part of reclamation. The proposed project includes a bridge above the Buena Vista creek channel. The bridge will contain two 3-foot wide piers. The proposed abutments will not impede flood flows. The channel design is narrowed as it approaches a drop structure in order to create a backwater situation that will reduce the upstream flow velocities.

The bridge design considers scour. Stream bed scour consists of general scour and local scour. General scour is related to the sediment supplied into and transported out of a channel reach. Local scour is due to a local flow obstruction by a bridge pier/bent or abutment. The total scour is the general scour plus the local scour. In this case, the drop structures will stabilize the channel bed at the bridge so that general scour will not occur. Furthermore, the abutments will be above the 100-year water surface elevations, so abutment scour will not be a concern.

The results of the hydraulic and scour analysis prepared by Chang Consultants show that the water surface elevations with and without the bridge match downstream of the bridge and at cross-section 3.846 (see Table 5.9-5. The maximum rise in the 100-year water surface elevations between these locations due to the bridge is 0.2 feet. However, there is sufficient freeboard near the bridge location so the slight rise was determined acceptable. Up to 6.6 feet of pier scour is predicted at each of the two piers. Each pier will be designed to account for this scour, therefore, the impact is considered less than significant.

Table 5.9-5. Comparison of HEC-RAS Results near Bridge

Cross-Section	100-Year Water Surface Elevation without Bridge (feet)	100-Year Water Surface Elevation with Bridge (feet)
3.774 (Downstream of Bridge)	84.5	84.5
3.792 (Upstream of Bridge)	85.7	85.9
3.808	86.1	86.3
3.825	86.5	86.7
3.827	86.4	86.6
3.828	85.8	86.0
3.830	86.6	86.7
3.838	88.0	88.1
3.846	88.3	88.3

Source: Chang Consultants 2011.

Failure of Levee or Dam

The majority of the project site is not located within a dam or levee inundation zone. Planning Area R-1 is protected by a levee. The current levee was designed and constructed in accordance sound engineering and levee design standards, which is based on FEMA's criteria and requires increased freeboard and specific embankment and foundation stability factors-of safety. FEMA places greater requirements on levees because they are frequently used to protected development from flood flows. Changes to the current levee will be done in accordance with the *Urban Levee Design Criteria* (ULDC) prepared by the California Department of Water Resources in May 2012. The ULDC provides criteria and guidance for design, evaluation, operation, and maintenance of levees and floodwalls in urban and urbanizing areas. The on-site basins may be designed with small berms; however, the berms will be designed adequately to reduce the potential for subsurface piping. Therefore, a less than significant impact is identified.

Inundation by Seiche, Tsunami, or Mudflow

The project site is not located within a seiche or tsunami hazard zone. The project site does contain varying slope degrees; however, development is proposed in an area of the project site that is relatively flat and not subject to mudflow. No impact is identified.

Off-site Improvements

Implementation of the proposed project will involve the construction of off-site improvements as described in EIR Section 3.0. These improvements include the Marron Trailhead. Improvements at this location consist of replacing the existing road with a vehicular turn-around, trail parking lot, walkway, and landscaped areas which will decrease the amount of impervious area in the post-project condition. Pursuant to the County of San Diego SUSMP (page 15), if the proposed project decreases the pre-project impervious area and peak flows, then a flow-duration analysis is implicitly not required. Additionally, pursuant to the City of Carlsbad SUSMP (page 13), project limited to… resurfacing and reconfiguring surface parking lots and existing roadways, new sidewalk construction… are not subject to additional stormwater treatment requirements; however, other requirements, including SWPPP documents/permits and incorporation of appropriate source controls may still apply and will be implemented as applicable.

5.9.4 Level of Significance Before Mitigation

As described above, proper implementation of the proposed project design measures and conformance with all applicable regulatory/industry standards would avoid or reduce the majority of hydrology and quality impacts below a level of significance. However, construction activities would generate dust and require the use of water trucks to meet fugitive dust requirements as described in Section 5.3, Air Quality, of this EIR. The use of water trucks increases the potential for silt to exit the project site and enter the surrounding Buena Vista Creek watershed. Also, the operation of the project has the potential to result in an increase in pollutants entering the adjacent creek. Therefore, the proposed project has the potential to result in significant adverse impacts related to erosion and siltation. Implementation of Mitigation Measures WQ-1 and WQ-2 is required.

5.9.5 Environmental Mitigation Measures

WQ-1 Prior to issuance of a grading permit for any phase of the development, the applicant shall prepare and submit for review and approval of the Carlsbad City Engineer, a Storm Water Pollution Prevention Program (SWPPP) to demonstrate that pollutants will be controlled through

compliance with the City of Carlsbad Standard Urban Stormwater Mitigation Plan (SUSMP), General Construction Stormwater Permit (Order No. 2009-0009-DWR, NPDES CAS000002), and the General Municipal Stormwater Permit (Order No. R9-2007-0001, NPDES CAS0108758). The applicant shall be responsible for monitoring and maintaining the BMP erosion control measures identified below on a weekly basis in accordance with the City's grading and erosion control requirements (Municipal Code Section 15.16. et seq.). The locations of all erosion control devices shall be noted on the grading plans. BMPs that shall be installed include, but are not limited to, the following:

- Silt fence, fiber rolls, or gravel bag berms;
- Check dams;
- Street sweeping and vacuuming;
- Storm drain inlet protection;
- Stabilized construction entrance/exit;
- Hydroseed, soil binders, or straw mulch;
- Containment of material delivery and storage areas;
- Stockpile management;
- Spill prevention and control;
- Waste management for solid, liquid, hazardous, and sanitary waste-contaminated soil; and
- Concrete waste management.

WQ-2 Prior to the issuance of grading permits or other approvals for any public or private right-of-way improvements or site development plans, the developer shall prepare and submit for review and approval of the Carlsbad City Engineer, improvement plans that demonstrate that pollutants will be controlled through compliance with the City of Carlsbad SUSMP and SWMP. Approval of such plans shall be subject to a determination by the Carlsbad City Engineer that the proposed project has implemented an integrated Low Impact Development (LID) approach to meet criteria described in the City of Carlsbad SUSMP. The proposed project has incorporated the following LID strategies which include site design BMPs, source control BMPs and structural treatment control BMPs into the project design to the maximum extent practicable:

- Optimization of site layout (100-foot vegetated buffer, 50-foot building setback, minimizing disturbance of natural areas);
- Minimization of directly connected impervious areas and directing runoff from impervious areas to landscape where possible;
- Non-contiguous sidewalks;
- Street sweeping;
- Appropriate pest management;
- Covered trash enclosures;
- Storm drain inlet labeling;

- Incorporation of landscape and open space areas;
- Bioretention Extended Detention Basins; and
- High rate media filter units.

5.9.6 Level of Significance After Mitigation

Implementation of Mitigation Measure WQ-1 will reduce the erosion, siltation, and water quality impacts to a level less than significant. Implementation of Mitigation Measure WQ-2 will reduce the potential long-term water quality impacts associated with operation of the project to a level less than significant.